The Excavating Engineer

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# Making a Million and a Half Barrels a Year of Portland Cement in the Cascade Mountains

**Replacement of Railroad-Type Shovels with a Full-Revolving Quarry Shovel at the Already Efficient Plant of the Superior Portland Cement, Inc., Reduces the Cost of Limestone Approximately Thirty Per Cent**

IN the Skagit Range of the Cascade Mountains, at the junction of the Baker and the Skagit Rivers, lies the town of Concrete, Washington. In this town, on a branch line of the Great Northern Railroad, is the plant of the Superior Portland Cement, Incorporated. This company was organized in 1906, and has since that time been constantly improving its plant, so that today it is recognized as one of the most modern and efficient plants in the country, and has a daily output of about 4,700 barrels of fine quality Portland cement.

### *Plant Electrically Operated Throughout*

The situation of the plant, in the mountains, and on the banks of the two mountain streams, is ideal for utilization of hydro-electric power. On Bear Creek, about seven miles from Concrete, the company have their own hydro-electric power station, where approximately one-half of the power used in their quarry and mill is generated. Power from this station is transmitted at a pressure of 12,000 volts, and stepped down in the company's transformer station at Concrete to 550 volts for use in the mill. The total power requirements of the plant is about 4,500 kilowatts, and about half this load is taken by the lines of the Puget Sound Power and Light Company, who generate at a station on the Baker River and transmit 25 miles to Sedro-Woolley, Washington, at a potential of 110,000 volts, and then transmit to Concrete at 60,000 volts, step down in their own transformers and deliver to the cement plant at 550 volts. All motors in the plant are operated on this 550-volt circuit except the electric shovel which is supplied with 2,200 volts from a special bank of transformers.

### *Maximum Height of Quarry Face 230 Feet*

Rising from the Baker River on the eastern shore about a mile and a half from the mill is a high limestone bluff composed of extremely hard rock. Here the Superior Portland Cement, Incorporated, have located their quarry, which supplies the mill with about 1,400 tons of rock daily, from a face of limestone which is one thousand feet long, averages one hundred and eighty feet and reaches a maximum of two hundred and thirty feet high. The limestone formation is covered with an overburden about six feet deep, composed of earth and debris, which is removed by hydraulic operations.

### *Electric Drills Sink Holes Eight Feet Below Quarry Floor from Top of Face*

Thirty-five feet back from the face of the quarry and twenty-five feet apart, eight-inch holes are drilled to a level eight feet below the quarry floor. The rock is unusually hard, and two Sanderson-Cyclone super-electric drills are kept busy putting down the holes which run as deep as two hundred and thirty-eight feet. The holes are loaded with both 60 per cent and 40 per cent Trojan powder, and about 120,000 tons of rock are shot down at each blast. At the present time the quarry face is being straightened, and one shot is made every three or four months; eventually, however, it is planned to drill the entire length of the face during the season and set off only one shot a year.

### *Full-Revolving Shovel Replaces Railroad-Type*

Up to the beginning of this year the loading of the rock was done by two 60-ton Marion railroad-type shovels equipped with 2½-yard dippers, which operating on an eight-hour shift produced between them 1,100 tons of rock a day. On January first of this year the company put into operation a Bucyrus 120-B full-revolving quarry and mining shovel. This machine carries a four-yard dipper and has a 29½-foot boom and 20-foot dipper handles. This machine operating one shift

of eight hours per day is turning out 1,400 tons a day. The maximum output for the best ten days in 1925 with the two 2½-yard shovels was 1500 tons, while with the 4-yard machine an output of slightly over 2,000 tons per day is obtained occasionally.

This Tramway, Between the Crushing Plant and the Cement Mill of the Superior Portland Cement, Incorporated, Has a Capacity of 250 Tons per Hour

*Rock Cost Cut 30 Per Cent*

The new shovel has cut the cost of rock about 30 per cent. This saving is made up in several other ways as well as by increased output. In the first place, the shovel is operated by two men who take turns in handling the levers, while the other is oiling. Another saving is the fact that only two pit men are required for the shovel, which means an elimination of ten men from the crew required by the two railroad-type shovels. In addition to these savings, the secondary powder cost has been cut in half, as the primary crusher now takes the rock passed by the four-yard dipper instead of the 2½-yard dipper. This reduces very considerably the amount which had to be broken up in front of railroad-type shovels by mud capping or pot holing.

In the present operation the 120-B shovel loads into 12-yard Western dump cars from the rock face, the cars being made up into trains of either two or three cars, and hauled by one of the two steam locomotives used by the company, one a 30-ton American and the other a 20-ton Davenport.

The shovel works on a cut of about 50 feet in width, and is dumping 25 feet from the center of the shovel, and the arc of swing is 60 to 180 degrees. The trains are hauled an average of 1500 feet, where the cars are dumped by a cable swung from the roof of the crusher house into the hopper of the primary crusher which is located below the rail level.

*Other Economies of Full Revolving Shovel*

The 4-yard revolving shovel has also shown considerable advantage because of its ability to overcast the pieces which are too large for its dipper. While the amount of oversize is considerably less with the 4-yard dipper than with the former 2½-yard machines, a certain amount is still encountered. These the shovel drops directly behind it, where they are drilled for shooting at quitting time. In this manner the shovel is able to work continuously. The ease with which this single-track, caterpillar-mounted shovel can be moved has also proved of advantage to the Superior Portland Cement, Incorporated. The bank has several times in the past fractured, and several times the resulting slides have seriously damaged the railroad-type shovel standing at the foot of the cliff. The full-revolving machine is moved

Reinforced Cement Silos and Packing House

a distance of 100 feet away from the face every evening at quitting time. To get the shovel 100 feet from the face means that the actual move is from 100 to 500 feet, and the time consummated in this moving, both in and out, is only 30 minutes a day, leaving 7½ hours for loading. During this move the electric cable is handled by only one man.

This Gives a Good Idea of the Material Loaded Out from the Limestone Quarry

*The Crushing Plant*

The 12-yard cars from the shovel are dumped directly into a 42-inch Traylor Bull Dog Gyratory Crusher set below the track level. From this crusher a bucket elevator takes the material, which is broken to a maximum of 8 inches thickness, to bins above two No. 4 and two No. 6 Allis-Chalmers Gates crushers, fed by four Sheridan Feeders. From this battery of crushers a 30-inch belt conveyor 350 feet long carries the material now crushed to 3-inch maximum size to the top of the aerial tramway terminal bin.

*Aerial Tramway More than a Mile and a Quarter Long with a Capacity of 250 Tons an Hour*

One of the interesting features of this cement company's operation is the aerial tramway which carries the material from the final bin of the crusher plant to the cement mill. This unusual tram 6,800 feet long and with a capacity of 250 tons per hour is one of the largest in operation; is laid out so that it operates by gravity, although controlled by a 30 horse power motor; and is, as far as we know, the only one supported on concrete towers.

From the tram terminal bin, which holds 700 tons, the material is loaded by air-controlled gates into the 1½-ton tram buckets, of which there are 80 in operation on the tramway. The loaded buckets are carried from crushing plant to cement mill on 1⅝-inch load cable and are returned on a 1-inch cable. The buckets are moved by a 1-inch driving cable. The cables are lock coil cables and were supplied by the American Steel and Wire Company, who designed, finished and supervised the installation of the tramway. The maximum span of the cables between towers in 1100 feet. Since the capacity of the tramway is fixed at 250 tons an hour, it is necessary to operate it overtime when the quarry exceeds this output. At the present time the tramway is in operation for about an hour every day after the quarry is shut down.

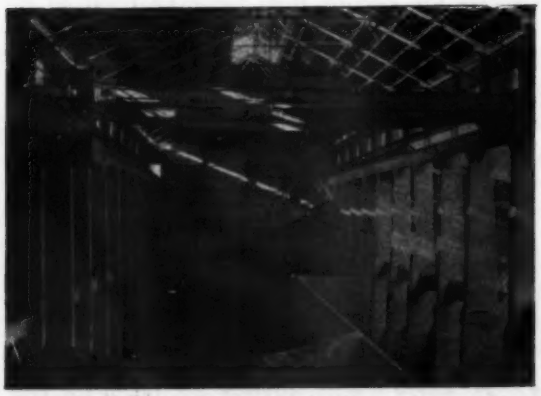
The building which houses the crusher end of the tram terminal also houses a rock-testing laboratory where hourly samples are taken for controlling the placing of the rock in storage. Here also are located two Ingersoll-Rand 14 x 12 air compressors, which furnish compressed air for the operation of the tram-loading gates and the drills used in the quarry. In the crushing plant, motors up to 250 horse power are in operation. These motors, because of the purchase of another mill, are of several makes: Allis-Chalmers, Bullock and General Electric. The motors on the shovel are General Electric.

At the mill end of the cableway the crushed limestone is deposited in an open storage 80 feet wide, 50 feet high by 250 feet long, capable of storing 65,000 tons. The rock from this storage is handled by an eleven-ton Shephard overhead traveling crane operating a 4-yard Blaw-Knox bucket.

The Rock Is Delivered to This 65,000-Ton Storage Pile by the Tramway, and Is Moved from the Pile by a 4-Yard Blaw-Knox Clamshell

*Clay Brought to Plant by Motor Truck*

Clay is dug from a clay pit a half-mile away from the mill, where it is excavated with a derrick operating with a clamshell bucket, which is served by five-ton Kenworthy trucks.



Inside of Clinker Storage — the Clamshell Is a 3-Yard Blaw-Knox

*The Cement Mill*

A brief description of the cement mill may prove of interest to our readers, as like the excavation operations the Superior Portland Cement, Incorporated's manufacturing plant is one of the most modern. Fed from the rock storage bins, two gear-driven Bradley Hercules Mills grind the limestone so 70 per cent passes through 20-mesh and 40 per cent through 200-mesh screens.

The clay after being washed and reduced to a slurry is added to the limestone in these mills. This slurry or water carrying the clay and limestone in suspension, is pumped with a Wilfley 4-inch pump to a storage trough and then passed through a battery of six tube mills. From these mills the slurry goes to seven tanks, from which under careful control the eighth or kiln feed tank is fed. From this last tank the slurry is fed into the large kilns for producing the clinker. There are six kilns, three measuring 8 x 7 x 12[illegible] feet and three 9 x 8 x 192 feet, capable of burning 4700 barrels of clinker in twenty-four hours. The clinker from these kilns is put in storage and is then fed by a 7-ton Shephard overhead traveling crane together with a certain amount of gypsum first to two Hercules mills, where it is given preliminary grinding, and finally into seven Allis-Chalmers tube mills, where it is reduced to a fine powder. The grinding equipment is capable of handling 7,000 barrels of cement a day. After the final grinding the dry cement is stored in fifteen reinforced concrete silos with a storage capacity of 100,000 barrels. From these silos the material is carried through conveyors underneath the railroad track to a power house where six Bates packers equipped with Cyclone dust collectors are capable of packing and loading two cars of cement an hour. Coal for the operation is secured from Bellingham, hauled over the Great Northern R. R.

The plant is not only modern in the actual manufacturing operations but is equipped with modern auxiliaries, such as a complete machine shop housed in a large reinforced concrete building. In the basement of the reinforced concrete office building is a laboratory which is equipped with a small experimental manufacturing plant and machines for breaking and testing samples.

The plant superintendent to whom we are indebted for the information contained in this article is H. A. Ambler. J. P. Brooks is quarry foreman. The shovel is operated by D. Killagrew and M. G. Munks. The two pitmen on the job are P. B. Blackwood and H. A. Warren.

The officers of the company, who maintain their head office at 1003 Seaboard Building, Seattle, are John C. Eden, president; C. H. Reitze, vice-president and general manager; and Gordon Tongue, treasurer and sales manager; Geo. L. Dickinson, secretary; C. L. Wagner, general superintendent is located at the mill.

La Mura Contracting Company's 1-yard Shovels at work on Excavation for the Yeshiva College Buildings, at Amsterdam Avenue and 187th Street, New York City.

# Rock Excavation in New York City

By Frank W. Skinner

**A Description of Some of the Recent Work of the La Mura Contracting Company in Basement Excavation In and About New York City**

In New York City the difficulties of basement excavation are many. The materials to be moved vary from treacherous quicksands in some parts of the city to hard gneiss rock of irregular stratification. The great cost of land makes it desirable to put the excavation down deep—several sub-basements being called for in some plans. The heavy traffic of the city tends to continually hinder the job, the ever-present crowds of people increase the chance of accident; old masonry and foundations of demolished buildings add to the problem, and the tall buildings often surrounding the job call for most unusual care in blasting and digging.

The La Mura Contracting Company of New York City has made a specialty of rock digging, and is considered today as one of the most successful basement excavation contracting organizations in the city. Its head, Fred La Mura, is very active in all work undertaken by the company, and, on the larger jobs, superintends personally the work of his efficient crews.

### *Excavation for Yeshiva College*

Among the interesting jobs that this company has recently completed is the excavation for the new Yeshiva College buildings. These buildings will house the first Jewish College ever established, one that will provide for the intensive Jewish training of 5,000 Jewish youths, and will grant the same academic degrees as other American colleges. These buildings have been described as the most significant and important work ever undertaken by the Jews of America.

The first three buildings arranged and equipped in accordance with the latest ideas and requirements for school and college convenience and efficiency will cost about two million dollars. They are being built upon a site between 186th Street and 187th Street, New York City. They will include a high school providing for 7500 students, a dormitory for 250 out-of-town students, and an auditorium capable of seating more than 2,000 people.

The total excavation involved in preparing the foundations for the buildings was 36,000 yards, of which 1000 yards was earth and the remaining 35,000 was rock. The excavation had 200 feet front on Amsterdam Avenue, 100 feet on 186th Street and 227 feet on 187th Street. The maximum depth was 20 feet, and the work was contracted at a price of $3.50 per cubic yard for rock moved from within 10 feet below the curb level and $4.50 per cubic yard for rock moved from below that level.

### *Very Careful Blasting Necessary*

The rock was very hard and free from seams, and it was necessary to break it up with explosives before it could be handled by the shovel. Holes were drilled by the use of compressed air operated jack hammers, for which air was sup-

On this job in solid gneiss rock the La Mura organization loaded out an average of fifty 5-yard trucks every eight-hour shift, in spite of the fact that almost every load contained one or two rocks which had to be handled by chain.

Excavation for New York General Hospital, between 167th and 168th Streets and Girard and Walton Avenues, in The Bronx, New York City.

plied by electrically driven air compressors, mounted on a concrete foundation and inclosed in a temporary house.

Holes were drilled to depths ranging up to fourteen feet, and each air drill averaged about 100 linear feet per day. Because of the close proximity of buildings which surrounded the excavation, it was necessary for the holes to be drilled very close together; in fact, sometimes they were drilled only a foot apart, so that the rock would be broken into sizes readily handled by the shovel with the use of only very small charges of dynamite, thus avoiding too much local disturbance. Du Pont dynamite was used for the blasts, which were usually made about three times a day, were very carefully protected by wire rope mats and by logs chained together to prevent large pieces from being thrown out of the excavation. This precaution avoided danger to pedestrians and adjacent property.

Basement excavation for Yeshiva College buildings. Note the large piece of rock being loaded by the shovel in the foreground; it is chained and swung from a dipper tooth.

This cellar excavation was 60 feet by 100 feet and 20 feet deep in solid gneiss rock. Note the wire rope mat in the foreground, used to confine the blasts.

*One-Yard Shovels Loading 5-Ton Trucks*

The rock was handled by two 30-B Bucyrus steam shovels mounted on caterpillars and equipped with one-yard dippers. The shovels were served by a fleet of fifteen five-ton Mack trucks. The haul was about two miles. The shovels dug in, of course, on the street level, and were taken out of the pit upon completion of the work over the planked ramp used by the motor trucks. The excavation was commenced in September, 1925, and was completed in January, 1926. Each shovel loaded out from 350 to 400 yards of rock in each eight-hour shift. Most of the rock was small enough to be handled by the dipper, although it was necessary to move some of the larger pieces by a chain hung over a dipper tooth.

*Excavation for New York City General Hospital*

Another important excavation job recently completed by the same contractor was the excavation for the New York City General Hospital, which will occupy an entire block between Girard and Walton Avenues from 167th to 168th Streets in the borough of the Bronx. The three main buildings, which like those for the Yeshiva College, were designed by architect Chas. B. Meyer, will cover the complete area of the block, and will cost in the neighborhood of three million dollars. The excavation required for the substructure amounted to 40,000 cubic yards, of which 30 per cent was rock that had to be drilled and blasted before handling. Here again the excavation ran to about 20 feet below the curb level. Two Bucyrus 1-yard shovels were used in the work, and for a few days a Marion Model 21 was on the job; these were served by a fleet of 5-ton trucks which entered and left the excavation on a single long ramp.

*Twelve Hundred Yards Per Day*

On this job Mr. La Mura superintended the

Fred La Mura, Head of La Mura Contracting Company.

work personally, and placed a small portable house adjacent to the sidewalk to serve as an office. As the lot was previously vacant, there was no debris from former buildings to be removed, and the soil was easily and rapidly handled at an average rate of about 1200 yards per day, that is, at about 600 yards per day for each shovel.

The rock, of very irregular stratification, did not break up readily, and was handled at the rate of about 400 yards per day for each shovel, the shift again being eight hours. The excavation was surrounded with buildings, which included a number of apartment houses and the elevated structure of the Woodlawn extension to the Lexington Avenue Subway. It was, therefore, necessary to take the usual precautions to confine the flying rock by wire rope mattresses and chained timbers. Dynamite was distributed in many small, well-placed charges, and only enough to actually loosen the rock and break it up into fairly large-sized pieces could be safely used.

### Why Freight Rates Seem High

The merchants paying freight charges on large shipments weighing many hundred pounds are so impressed with the amount that they seldom think of the charge from the standpoint of the individual selling unit. Then as a result, it is assumed the freight paid greatly enhances the prices charged.

A bulletin issued recently by the Santa Fe System gives in detail the actual freight charges on representative articles in every day use from producing and distributing centers to representative consuming centers on that railroad. The freight on a suit of men's clothing from Chicago to Topeka, Kansas, is 6.1 cents; to Oklahoma City, 9.1 cents; to Houston, Texas, 10.9 cents; to Albuquerque, 13.4 cents; and to Los Angeles, 16 cents. A pair of shoes from St. Louis, one of the largest shoe manufacturing and distributing centers, to Coffeyville, Kansas, is 4.1 cents; to Ardmore, Oklahoma, 6.4 cents; to Amarillo, Texas, 7.2 cents; to Albuquerque, 9.1 cents; and to Phoenix, Arizona, 13.2 cents. Further, the freight on a man's hat from Philadelphia, a large hat manufacturing and distributing center, to Dodge City, Kansas, is 1.4 cents; to Woodward, Oklahoma, 1.3 cents; to Denver, 1.5 cents; to Albuquerque, 1.7 cents; and to Los Angeles, 1.8 cents. The freight on a pound of coffee from New Orleans to Coffeyville, Kansas, is 8.5 mills; to Oklahoma City, 7.8 mills; to Amarillo, Texas, approximately 1 cent; and to Denver 1.3 cents. The freight on a pound of sugar from New Orleans to Houston, Texas, is 2.9 mills; to Coffeyville, Kansas, 6.5 mills; to Woodward, Oklahoma, 7.2 mills; from San Francisco to Phoenix, Arizona, 7.1 mills; to Albuquerque, 8.4 mills; and from Rocky Ford, Colorado, to Kansas City, 5.5 mills. The freight on a pneumatic tire from Akron, Ohio, to Dodge City, Kansas, is 48 cents; to Ardmore, Oklahoma, 44 cents; to Amarillo, Texas, 46½ cents; to Denver, 49 cents; and to Phoenix, Arizona, only 60½ cents. The freight on a sulky plow, weighing on an average 550 pounds, from Moline, Illinois, to Coffeyville, Kansas, 491 miles, is $3.21; to Oklahoma City, 673 miles, $5.03; and to Denver, 1,041 miles, $6.19. The freight charges on a farm wagon, weighing about 1,100 pounds, from Chicago to Topeka, Kansas, 519 miles, is $6.60; to Ardmore, Oklahoma, 908 miles, $12.98; and to Denver, 1,175 miles, $13.42.

— *Railway Review.*

### Motor Vehicles in Foreign Countries

The ratio of population to motor vehicles in some of the more important foreign countries is as follows: France, 1 to 69; Germany 1 to 272; Japan, 1 to 2,645; India, 1 to 7,497; Russia, 1 to 8,896; China, 1 to 39,696.

— *Engineering and Contracting.*

According to the "Journal of the American Belgian Chamber of Commerce in Belgium," the ever-increasing demand for Portland cement all over the world has nearly doubled in the last three years, and reliable statistics show that it will again double itself in the next two years.

## A Combination Haul Plant for Concrete Road Construction

*Combined Use of Trucks and Narrow Gauge Cars for Hauling Materials to the Mixer*

Last fall the Geo. S. Mellert-Weidner Company of Medina, Ohio, had an opportunity to try out a somewhat original and novel hauling plant, where in addition to trucks, a transfer and narrow gauge cars were used. According to Mr. T. J. Weidner, secretary and treasurer of the company, considerable saving of time resulted from the use of this plant. The work was twelve miles of sixteen-foot concrete road, with an average thickness of seven and one-quarter inches, in Ashtabula County, Ohio.

A large portion of the subgrade was sandy, while in other places it was entirely of clay. The sections of clay subgrade were particularly bad in wet weather, and a great many rainy days were encountered during the time the work was in

The Transfer in Action, Loading the Boxes from the Truck onto the Train for Delivery to the Mixer

progress. As it was desired to complete as much of the work as possible before the close of the season, two outfits were put to work, one at each end of the road. The two outfits were identical as far as the subgrading, mixing, and placing equipment was concerned, except that at one the combination hauling plant was used.

### *The Combination Plant*

From the central proportioning plant the materials were hauled on trucks in batch boxes to a transfer. Here the boxes were lifted off the trucks and placed on narrow gauge cars for delivery to the mixer, past the green concrete. At the beginning the mixer started operations at the transfer point. After about two miles of concrete was laid, the transfer station was moved forward as far as the concrete was cured sufficiently to allow trucking over it. As the work progressed, this transfer was continually moved ahead, so as to allow trucking over the new concrete.

The transfer consisted of an I-beam across the road, carried on two A-frames. A hoist carried on a trolley on this I-beam was operated by a Ford engine placed at one end of the transfer. The entire transfer cost about $1,000 and proved to be quick and economical. A box could be trans-

Lifting the batch boxes off the train. Note that the mixer is equipped with a small crane for this purpose.

ferred from truck to car or vice versa in a little less than one minute. This device was entirely home made, and was designed by Mr. L. J. Westland, a member of the Mellert-Weidner Co., who acted as superintendent on this job.

Two 21-E mixers were used on this job. The haulage equipment consisted of Lakewood track, cars, and batch boxes, together with two seven-ton Plymouth locomotives. On the maximum haul three trains were used, which consisted of eight cars and sixteen boxes.

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## The World's Largest Diesel-Electric Dipper Dredge Launched

At 10:15 a. m. on April 22nd, there slipped into the water at the Camden Yards of the American Brown Boveri Electric Corporation, the first Diesel-electric dipper dredge in the United States, and the most powerful craft of its type in the world.

This machine, recently completed by the Bucyrus Company of South Milwaukee for the Great Lakes Dredge and Dock Company, is powered by two Diesel engines connected with generators which supplied a total of 1300 horse power to the 25 electric motors which will operate the machinery. The dipper has a capacity of 10 cubic yards, and may be adapted for excavation in either rock or earth.

The boat, the hull of which is 167 feet long, will dig to a depth of 50 feet, and is capable of working in either salt or fresh water. The living headquarters of the boat are very complete, and since it evaporates its own drinking water, it is capable of operating off shore, independent of food supplies, for a period of six weeks.

The Excavating Engineer

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## Current Business

One of the most interesting phases of the business situation up to the middle of May was the sequence of events which showed that a major downward movement of the security market no longer heralds a similar slump for business in general. It is unquestionably true that the stock market decline has had a sobering effect upon business, but it would be difficult to measure the influence, because there is no doubt but that the late spring and the unseasonal cold weather of the month of April had a very decided retarding action upon the volume.

Trade and manufacturing has been maintained at very high levels for a period much longer than usual. If no industry or branch of industry committed the error of overproducing, there is no reason why a very high level of trade and manufacture should not continue indefinitely. But it is apparent that some lines have gone ahead a little too fast, and the minor readjustment which has come about places us on a more normal level and gives us a much greater assurance of the continuance of stability.

Many of us, however, are particularly interested in the building industry, and here we find conditions such that there is nothing which gives ground for predicting anything but that the slackening of the industry, so often heralded by pessimists, is indefinitely postponed. Forecasts indicate that the building total for the year will not be below that of 1925. According to the F. W. Dodge Corporation, total new building contract awards for the month of March reached the figure of $597,879,300. This figure sets a new high record for the month of March, shows a gain of 53 per cent over the month of February and a gain of 22 per cent over March of a year ago.

The steel industry has set a new high mark, and has experienced a longer period of sustained operations than is usual. Apparently, as in other industries, the consumers are buying from hand to mouth, rather than accumulate stocks, for while production is now running at the highest rate in history, the unfilled orders for the Steel Corporation are less than half of those reported at the corresponding time in 1920.

The textile industries are not extremely active.

The figure of checks cashed at banks covers all departments of business, and is, therefore, a very good yardstick for the volume of total business transacted. The National City Company gives these figures for 140 principal cities (excluding New York as being effected too much by the security market activity). The total is as follows:

| | 1925 | 1926 | Per Cent Increase |
|---|---|---|---|
| January | $856,813,000 | $943,231,000 | 10.1 |
| February | 844,154,000 | 912,714,000 | 8.1 |
| March | 816,108,000 | 867,854,000 | 6.3 |
| April 1-21 | 804,300,000 | 880,400,000 | 9.5 |

It will be noted from this that while there is a decided increase over the volume of last year, a slight slowing up has been apparent.

Railway car loadings have continued to run ahead of all previous years. Gains over last year in coal, grain, grain products, merchandising, coke, and less than carload freight, make up for losses in loading of livestock, forest products or miscellaneous freight. The increase in less than carload lot shipments appears to point out again the current tendency of merchants to order in small amounts but at frequent intervals.

In the automobile industry, sales have held up very well in spite of the handicap of bad weather, and while for the first quarter output ran ahead of sales; the seasonal spring demand will probably show that stocks are not dangerously high. It is interesting to note that should the last three-quarters of the year repeat the gains in production over 1925 shown by the first quarter of 1926, the total output of passenger cars for the current year would reach nearly four and a half millions, which is considerably over any previous year.

As this is written the money market presents a very interesting condition. In spite of the high volume of trade and manufacturing, call money (loans contracted on the stock exchange) has dropped as low as 3 per cent. Time loans on stock market collateral, for maturities up to six months, reached the lowest since last summer at 4 per cent. Commercial paper has likewise been easier—in some cases as low as 3½ per cent and 4 per cent as compared with 4¼ per cent and 4½ per cent earlier in the year.

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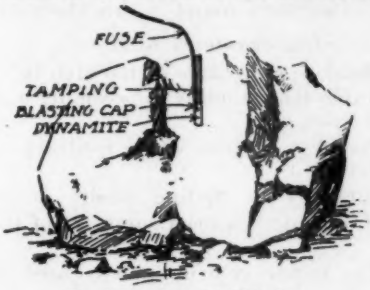
According to Mr. Otto M. Graves, of Easton, Pennsylvania, president of the National Crushed Stone Association, speaking at a northern regional convention of that organization, more than two billion dollars will be spent in the United States during the next ten years for the construction of new highways. This figure will build about 100,000 miles of new highway. Furthermore, it is expected that six million will be spent by the end of 1926.

## · FIELD NOTES ·

### Methods of Blasting in Front of the Shovel

The amount of work done by the steam shovel per day is increased and the cost per ton of material loaded is decreased by efficiency in blasting the large pieces of rock ahead of the shovel, so that they can be quickly and easily handled by the shovel.

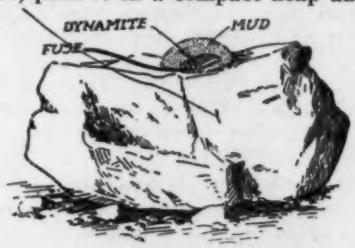
The blockhole method of blasting the boulders is the cheapest and usually the most satisfactory on all counts. The hole is drilled in the middle of the boulder and about half way through its depth so that the charge will be located in the center of the mass. The steam shovel should be equipped with a small air compressor, and one or more jackhammer drills should be provided, so that blockholes can be rapidly drilled by the shovel crew. Practically any kind of dynamite can be used for blockholing, but an ammonia powder will do the work at the lowest cost. In




Blockhole Method of Blasting

ordinary limestone 20 or 30 per cent ammonia dynamite gives excellent breakage. For harder rocks the 40 per cent strength is required. Boulders in the way of the shovel are rarely so large as to require more than one cartridge to break them by this method, and often a half cartridge is sufficient. Considerable economy can be effected by using 1-inch x 8-inch cartridges, dressing the drill bits to make the hole of proper diameter for this size cartridge. The charge is primed with blasting cap and fuse, the fuse being cut long enough to extend 8 or 10 inches out of the hole. After the dynamite is pressed down in the bottom of the hole, the remainder of the hole is tamped firmly to the collar with clay or loam. Tight tamping increases the shattering effect of the explosive.

Blasting boulders by the mudcapping method has just one advantage over blockholing. It is quicker as no drilling is required. In an emergency where speed is the chief requirement, or where no drill is at hand, or in work where only an occasional boulder is found too large for the shovel to handle, this method is useful. A straight dynamite must be employed, usually of 50 per cent strength, for only a strong, quick explosive will shatter the rock when there is so little confinement of the charge. The cartridges are sometimes simply slit and pressed close together on the rock, but it is better to take the dynamite out of the wrappers, pack it in a compact heap and spread




Mudcapping Method of Blasting

the flattened out paper shells over it. In either case a blasting cap with fuse attached is inserted and the charge is covered with 5 or 6 inches of mud. As this method of boulder blasting requires a minimum of five or six sticks of high-grade dynamite for each boulder, it is too expensive to be recommended for general blasting ahead of the steam shovel.

Whenever blasting is done near a steam shovel care must be exercised to protect the dynamite and blasting caps from sparks from the shovel, as these may possibly set the explosives on fire or cause a premature explosion.

— *Engineering and Contracting.*

### Don'ts for Rock Drill Operators

The following suggestions on the operation of rock drills are taken from *Compressed Air Magazine*:

Don't expect your machine to do first-class work without giving it first-class care.

Use a proper grade of oil and plenty of it, and do not use cup grease in the lubricator, air spud, or feed screw.

Prevent water leakage from removing oil which should reach the moving parts. The chief reason for water leakage is improper placement of the water tube, or the use of defective rubber.

Don't shut off the air throttle completely before shutting off water.

Don't use a leaky brass water valve.

Keep air-filter screen clean, and blow out hose thoroughly before making connection.

Keep side rods tight and even.

Run on half throttle when holding back on crank.

In striking your steel, be careful not to hit the machine.

## Survey Shows Horse and Truck Advantages

By P. L. Sniffin

An investigation was recently conducted by the writer among concerns using both horses and trucks in all parts of the country in order to find out the conditions which make horses or trucks the most profitable investment.

The following is the summary of the results: By studying this summary, the excavating engineer may see which of the two types can be used most profitably under his own conditions.

### *Road Conditions*

Motor Truck — Where roads and pavements are good but where steep grades must be encountered.

Horse Equipment — Where condition of roads and pavements is poor, and where approach to loading or unloading point is difficult because of poor roads.

### *Kinds of Hauls*

Motor Truck — Long hauls with uniformly large loads.

Horse Equipment — Short routes with varying requirements.

### *Local Conditions*

Motor Truck — Where cost of keeping horses is high (usually in cities).

Horse Equipment — Where stabling costs are low.

If conditions are apt to change, requiring different uses or the sale or exchange of the equipment, this favors the horse equipment because it is more easily sold and, in some cases, with little, if any, depreciation. Furthermore, with respect to the horse, this unit is adaptable to any changing conditions, for it may be attached to any kind of vehicle or used singly or in multiple teams.

### *Advantages of Trucks*

Summarizing the opinions which were expressed, we have the following five "advantages" of motor trucks:

1. No limit to length of a day's run. They are ready for emergency service even after they have completed a full day's work.

2. Able to keep up speed to the end of a day's work, which is not true of horses. The horses' producing power is depleted after a certain amount of use.

3. Able to carry heavy loads when necessary without the sacrifice of regularity and dependability.

4. Road repair service is obtainable practically anywhere, not always true of horseshoeing and harness repairing facilities.

### *Advantages of Horses*

Likewise, we can quote the experience of those who have found horses to be profitable in the form of these five points:

1. Low cost of equipment. Where capital is limited the horse and wagon meets the hauling requirements with a minimum investment.

2. Depreciation and repair costs are low, in fact, sometimes negligible.

3. Adaptability from one carrying unit to another, especially important where hauling requirements are not steady.

4. Fewer and less serious accidents. Less risk of fines and consequences of violating city ordinances, speed laws, etc. Lower cost for licenses, taxes, etc.

5. Driver need not be a skilled chauffeur or mechanic, as in the case of trucks.

The survey brought out some interesting opinions as to why a concern was opposed to a certain type. Here are the tabulated "disadvantages" as they were found in this observation:

### *Disadvantages of Horses*

1. Stable space scarce or too high in cost. It is noticeable that stabling is becoming a problem in large cities.

2. Too slow on jobs where contract calls for rush work.

3. Difficulty of finding public horseshoers.

The following is a brief summary of the above data:

1. The motor vehicle is best used on long hauls; where speed is necessary; where proper maintenance can be provided; where fire risk can be avoided; where roads are hilly and of fairly good condition; where hauling requirements are strenuous; where idle vehicle time can be used in some way for profit.

2. The horse and wagon is best used on short hauls where roads are poor; where capital is limited; where speed is not a requisite; where stable space is not expensive; where idle standing time is great; where future conditions are uncertain; where good driver-mechanics are difficult to obtain.

---

## Her Donation

*Canvasser* — "Madame, will you donate something to the new hospital?"

*Mrs. Clancy* (who has just finished an argument) — "Well, ye might step in an' take a look at Clancy. Maybe he'd do." — *The American Legion Weekly.*

---

## "By Ear"

"My dear young lady," said the clergyman in grieved tones, as he listened to the extremely modern young woman tear off some of the very latest jazz on the piano, "have you ever heard of the Ten Commandments?"

Modern Young Lady: "Whistle a few bars and I think I can follow you."

## DEVICES YOU OUGHT TO KNOW ABOUT

### Improvements in Heil Hoist Design

Some important changes in the design of the Heil Hoist have just been announced by *The Heil Company, Milwaukee, Wisconsin.*

These changes are of a decided importance to the dump truck operator, because they make possible higher dumping angles, reduce weight, and do away with oil troubles.

The oil capacity of the new style No. 45-26 hoist is 16 quarts, whereas the oil capacity of the old No. 48 hoist was 20 quarts. All other models have been reduced in proportion. The weight of the hoists filled with oil has been reduced from

20 to 40 pounds, a very important amount for haulers in certain states.

The elimination of the sheet metal tank gives the new 1926 models a more finished and clean-cut appearance. The simplicity of the Heil hoist meets with great favor among contractors, coal dealers, highway departments and haulers of all kinds. The twin-cylinder feature reduces the average working pressure but makes possible a great lifting power for an emergency. The pump can develop 1000 pounds per square inch of piston head area. The Heil Company have interesting data available on these new models which they will be glad to send to anyone interested.

### New Miami One-Man Power Scraper

*The Miami Trailer-Scraper Company, Troy, Ohio,* have recently placed on the market a new Miami one-man power scraper. This new scraper is equipped with Timken taper roller bearings,

A Fleet of Miami One-Man Power Scrapers Drawn by Fordson Tractors

has a power winch, and a cast steel tractor hitch and friction drive wheel furnished with scraper. Further information can be obtained upon addressing the above manufacturer.

### Milburn Markets New Welding Torch

Consistent with the demand for a small welding torch for work not requiring the usual standard torch, The Alexander Milburn Company, Baltimore, Maryland, has perfected the Type J-Jr. Torch. The torch uses the same tips as are supplied with the standard larger torches, and is adaptable to all classes of welding. It uses low and comparatively equal pressures of oxygen and acetylene.

The J-Jr. is 18 inches long, weighs 25 ounces, and is furnished with three welding tips adaptable to a wide range of welding.

### General Electric Temperature Overload Relay Redesigned

The General Electric temperature overload relay known as the TC-121 has been redesigned. This relay has two heating elements connected in each two phases, so that complete protection is provided for single, two or three-phase motors. On direct-current circuits, the heating elements are connected on each side of the line.

The improved relay is known as the form C, or TC-121-C. The improvements in design allow the use of renewable heating elements, prevent the bending of thermostatic strips by operators, and include a better mechanical construction. The relay is reset by means of a cord and button suspended from the bottom.

# SHOTS FROM THE · FIRING LINE ·

## Central States Notes

We hear from Wm. T. Lundquist at Kennett, Missouri, that he is now located in that town running a Bucyrus Class-20 Diesel electric dragline for Broderick Brothers.

## Eastern States Notes

Robert M. Rogers, who until recently was operating a dragline for the Florida State Road Department, writes that he is running a Bucyrus 20-B steam shovel for the District Foundation Company in Washington, District of Columbia.

## New York Notes

J. J. Ziegenhagel writes that he is located in the Bronx on one of La Mura Contracting Company's three Bucyrus 30-B's. These three machines, the work of which is described elsewhere in this issue, are to be moved shortly on to a 75,000-yard job. The snapshot reproduced above shows La Mura's machine No. 6.

## Pacific Coast Notes

BY J. H. SACKETT

Contract awarded to W. H. Hauser by the California Highway Commission, San Francisco, for construction of one mile of bituminized macadam in Sonoma County from Vineburg Junction to county line.

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Plans and specifications are being completed by United States Reclamation Service, Denver, Colorado, and Washington, District of Columbia, bids to be called for soon for the construction of Sun River Project, Montana, involving the construction of the Gibson Dam to create a storage reservoir on the north fork of Sun River in Lewis and Clark National Forest, about 23 miles from Augusta, Montana. Dam is to be concrete construction, massive arched type, 200 feet high with balanced needle valves for outlet control. A vertical shaft and tunnel spillway will be provided in left abutment. Work involves in main: 170,000 cubic yards concrete; 88,000 cubic yards open excavation, and 25,000 yards tunnel and shaft excavation. Cost $3,000,000. Funds appropriated. G. O. Sanford, Fairfield, Montana, is superintendent.

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Contract awarded to Winston Bros., Minneapolis, Minnesota, at about $1,500,000 for the construction of a reinforced concrete dam, power house and forebay dyke at Lewiston, Idaho, for the Inland Power and Light Company. E. V. Lorenz, Lewiston, Idaho, is engineer.

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Plans have been completed by the Engineering Department, Pacific Gas & Electric Co., 245 Market Street, San Francisco, who will start construction at once on the following power development project located on the Mokelumne River in Amador and Calaveras County, work involving the construction of: Dam on the Mokelumne River at Salt Springs, elevation 3800 feet above sea level, to be rock-fill type with concrete face, 200 feet high, work involving approximately 1,000,000 cubic yards rock fill, 25 miles of concrete lined canal and tunnel running from the dam to Tiger Creek; construction of power plant to have capacity of 40,000 h. p., 1200-foot drop; construction of about 25 miles of road. Total estimated cost of this development is $10,000,000.

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Contract awarded by Western Pacific Railroad Co., Mills Building, San Francisco, to Eaton & Smith, 715 Ocean Avenue, San Francisco, at about $200,000 for the construction of new trackage in industrial districts south of Market Street.

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Contracts awarded as follows by the Denver and Rio Grande Western Railroad Company: (1) To Utah Construction Co., Ogden, Utah, and Phelan Building, San Francisco, for rectification and alignment of main track from Gypsum to Glenwood Springs, Colorado; changes between Gypsum and Dotsero; relining Red Hill Tunnel, including constructing detour line. (2) To Morrison Knudsen Co., Boise, Idaho, for the enlarging of three solid rock tunnels for the Denver and Rio Grande Western Railroad Company in the Colorado River Canyon.

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Contract awarded to Utah Construction Co., Ogden, for constructing new line for Denver & Rio Grande Railroad from Helper to Kenilworth, Utah.

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Contract awarded to Utah Construction Co., Phelan Building, San Francisco, for grading work for the Southern Pacific Co., in connection with the widening of tracks at Roseville, Placer County, work involving 60,000 cubic yards grading.

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Morrison-Knudson have started their work at Roseville, California, for the Pacific Fruit Express Co. and have shipped in a Bucyrus 30-B Diesel shovel. Part of the work has been sublet to C. Miles of Sacramento.

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Edward T. Telford writes that he is at present working for the H. B. Haley Company on a land classification contract for the County Assessor's Office of Placer County, California.

## Pittsburgh and Vicinity

BY FRANK R. SMITH AND GEO. O. RAGNER

John F. Casey Company have their contract practically finished on the Canton Cut-off. Their Bucyrus 50-B held the yardage record on this work, making an average of about 36,000 yards per month, single shift.

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M. Bennett & Sons obtained a road contract from Pennsylvania State Highway Commission for road work, being one of the largest contracts ever let in the State.

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R. H. Cunningham & Sons are starting their Bucyrus 20-B Diesels to work to finish up a road contract which was held over from last year.

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The Tice-Flynn Coal Company have shipped their Bucyrus 80-B to the Cadiz, Ohio, District, and they are stripping there on a contract basis.

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Narva Coal Company, Steubenville, Ohio, had a record run last month, and W. R. Walker, Superintendent, stated that they loaded out 18,000 tons.

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Mike Netherland's Bucyrus 20-B is working at the Ward Baking Company's plant. Mr. Hendricks is operating the levers.

UMI

# One Principle for 20 Years

PITTSBURGH

The Type G6 Extension Side Dump Car is the last development of balanced door dump cars under the personal supervision of the inventor. It is the sixth type of the 30-yard equipment and has not been changed for five years.

Older types are being readily remodeled and modernized where the finer economies of the last development justify the changes.

Users of earlier types of Extension Side Dump Cars may be interested in having us figure on modernizing their equipment.

PITTSBURGH

CLARK CAR COMPANY

BALANCED DOOR DUMP CARS

PITTSBURGH, PA.

San Francisco Rialto Bldg. | Chicago Peoples Gas Bldg. | New York 52 Vanderbilt Ave. | Boston 683 Atlantic Ave.

For convenience in making inquiry use postal inserted in this number.

## SHOTS FROM THE FIRING LINE — Cont.

Joe Carlson from the State of Washington was in the office today. He is looking for work in this district. He is a shovel runner and has operated Bucyrus 320-B, 225-B, 50-B and 70-C shovels.

Booth & Flynn have started operation on the 10th Street Tunnel.

Considerable state and county road work is being started in the vicinity of Pittsburgh by many of the road builders in this territory. R. H. Cunningham & Sons of Turtle Creek have several big jobs going on right now, as well as Fort Pitt Construction Co. of Pittsburgh, and Frazier & Mansfield, of McKeesport, Pennsylvania.

Booth & Flinn, Limited, of Pittsburgh, have been awarded the contract for the construction of a new road in Allegheny County to be known as "Fleming Park Road." There is 306,000 yards of excavation in this contract, and shovels will soon be placed on this work by the above company.

Pittsburgh Foundation Co. have just completed excavation for the new Athletic Field for the McKeesport Technical High School. John B. Sweeney is the president of this outfit, and reports receiving a half-million dollar contract at Buffalo, New York.

Bucanelly & Braum of West Elizabeth, Pennsylvania, are pouring concrete on their Charleroi work for the Charleroi Home Building Co. Eugene Bucanelly, president of this concern, advises that he expects to be through with this project in another sixty days, and when completed will be the site of many new homes to be built by the Charleroi Corporation.

T. J. Foley Co. of this city have considerable work going on at this time for several of the railroads in this district. J. F. Kunz, general superintendent of the Foley Company, advises that they will be through with their Allison Park Work in another thirty days. The Foley Company have recently been awarded work in New Jersey, West Virginia and Ohio, and will be quite busy during the rest of the construction season completing work they now have on hand.

Frazier & Mansfield, contractors of McKeesport, Pennsylvania, have recently been awarded contract for the construction of the East Pittsburgh-McKeesport Boulevard, which is being done under the supervision of Allegheny County. This concern also has been awarded work by the Fayette County Commissioners on a project that adjoins their last state road job in that county. They have also been awarded sewer work by the city of Clairton that will total $75,000.00.

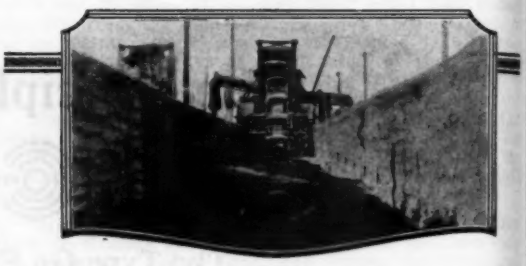
Jones & Laughlin Steel Corporation are now taking bids for the construction of a four-mile railroad leading to their Shannopin Coal Company operation at Poland, Pennsylvania. This operation is a new one, and the contractor receiving this work will have considerable masonry work as well as excavation work.

### Southern States Notes

BY W. W. WHORLEY

T. W. Linan is stripping and loading phosphate with a Bucyrus 50-B dragline at Mount Pleasant, Tennessee, for the Charleston, South Carolina, Mining & Manufacturing Company. O. A. Trice is handling a Bucyrus Class-14 dragline on the same job.


**Every Buckeye Has Greater Digging Range**



The Rotary Auxiliary Cutter enables every Buckeye to dig many widths of trench. Therefore, any Buckeye can do the work of several ordinary excavators.

These great digging ranges mean *big* yardage — they assure tomorrow's profits as well as today's.

Rapid and easy change of trench widths is possible with this Rotary Cutter — the time you save decreases costs or adds to your profits.

This is only one of the many advantages Buckeye offers to trench excavator users. Among others are the quick-shift conveyor, "oversize" power plant, extra rugged parts, and Alligator Traction. All are cost-reducers — profit-earners.

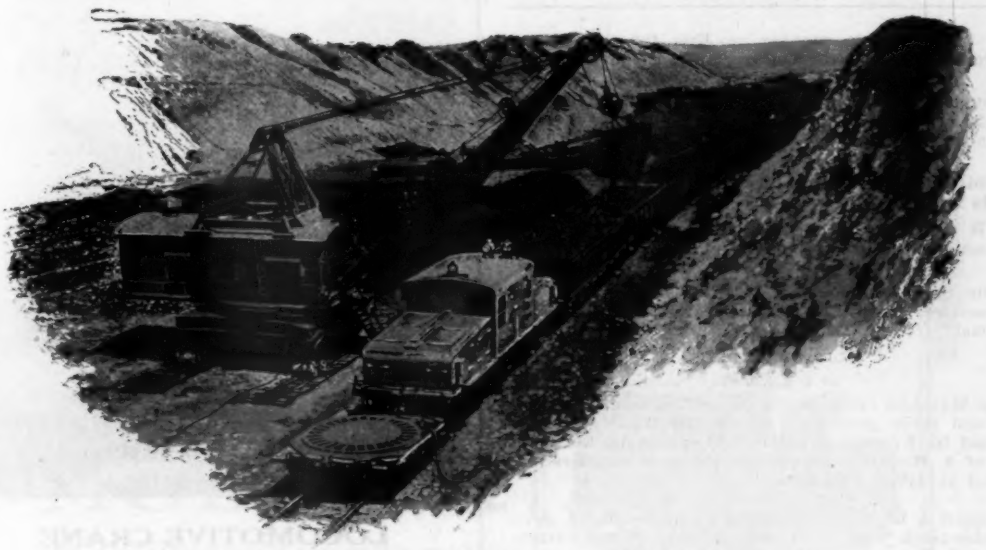
**The Buckeye Traction Ditcher Co.**

*Manufacturers of Trench Excavators (both Wheel and Chain-and-Bucket Types), Pipe-Line Trench Excavators, Tile and Open Ditchers, Back-Fillers, Pipe Screwing Machines, Curb Diggers and Clay Diggers.*

**Findlay, Ohio**

There's a Buckeye Sales and Service Office Near You

BUILDERS OF TRENCH EXCAVATORS FOR OVER 30 YEARS



# Digging coal by wire

TO the Northern Pacific Railway belongs the credit for this thrifty achievement in coal supply.

At Colstrip, Montana, the railroad owned a 180-acre bed of coal, lying almost on the surface—a cheap, convenient source of fuel for trans-continental trains.

But the mining of it offered peculiar problems. The water of the district was so alkaline it could not be used in steam engines. The coal slacked so quickly that it could not be stored.

A power line ninety miles long solved the difficulties. Electric shovels that require no water now strip the surface earth—tons at a time—mine the coal and load it. Giant storage battery locomotives of 60 tons capacity haul the loaded trains to the main line, for immediate use.

Industry after industry owes a similar debt to electricity. It is continually tapping natural resources that mankind could not otherwise have enjoyed for another hundred years.

To help industry and the railroads do their work more economically is an important service, but to save human energy is even more important. The General Electric Company designs and manufactures the equipment by which electricity does both.

7-638

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN ALL PRINCIPAL CITIES

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## SHOTS FROM THE FIRING LINE — Cont.

R. L. Pollock is running an Erie for the Colbert Limerock Company near Colbert, Alabama.

Douglas, Buchanan & Crow have installed a Bucyrus Class-20 dragline on their work for the L. R. & N. Railway, near Simmesport, Louisiana.

Reid & Lowe landed a nice bit of railroad work in Florida recently.

J. W. Noble has installed a Bucyrus 50-B shovel on his work near St. Francisville, Louisiana.

Ellis, Smeathers & Brantley have installed a Bucyrus 30-B on their Central of Georgia work near Goodwater, Alabama.

### St. Louis Items

BY A. B. KOENIG

The Massman Construction Co. were awarded a revetment and shore protection job by the Missouri Pacific Railroad in Western Missouri. They bought the team outfit of A. Hood last month and placed it on a grading contract at Albany, Missouri.

Shugart & Blythe were awarded contract for a piece of double-track work at Waterloo, Iowa, by the Illinois Central Railroad Co. This firm have sublet all their team work on the Welland Canal in Ontario, Canada.

Engineers are engaged in putting the finishing touches on the survey of the new race track at the State Fair Grounds, Springfield, Illinois, and when this work is completed figures will be compiled and bids will be advertised for. It is the plan of State Fair officials to have the grading done before the opening of the State Fair, so that work on the track and new grandstand may begin as soon as possible after the close of the annual exposition.

Chas. Gould died in Kansas City after an illness of a few days.

Chas. Dooling came in from Denver, Colorado, and left for Sprague & Nicely's work at Washington, Missouri, on the Missouri Pacific Railroad.

The Arkansas State Highway Commission concluded its April session at Little Rock by awarding the following contracts in Union, Columbia and Quachita Counties: Grading and small bridge and culvert structures on 18 miles of the El Dorado-Magnolia Road in Union County, to Turrent & Miles of El Dorado for $80,109; Graveling six miles of the Magnolia-Village Road in Columbia County to J. G. Newkirk of Prescott, for $11,551; Grading, bridges, culverts and graveling of eight miles of the Camden-Stephens Road in Quachita County to J. G. Newkirk for $48,112.

Dobson & Robinson, with a bid of $73,747.32, are low bidders for the construction of the connecting link on the Beardstown Hard Road near Virginia, Illinois.

The first contract under the St. Louis-San Francisco Railway Company's $2,500,000 budget for rehabilitating the Muscle Shoals, Birmingham & Pensacola Railway, recently acquired, was let to Reed & Lowe, Birmingham, Alabama, contractors. The contract provides for construction of six miles of new track at Boggy Creek and Turpentine Hill, Alabama, to reduce heavy grades in the existing line. Work is to begin immediately.

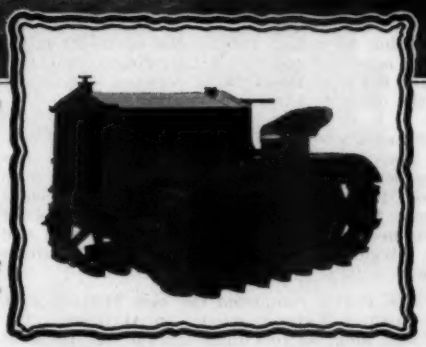
**LOCOMOTIVE CRANE**
**BUILT BY**
**LINK-BELT COMPANY**
**Chicago, Ill.**

Consider the reputation of Link-Belt Co.

Would they risk that reputation by using anything but the best quality of boiler?

**JOHNSTON BROS., Inc.**
***Specializing in Boilers for Contractors' Equipment***
**FERRYSBURG, MICHIGAN**

# Cletrac "K" MODEL



***The Outstanding Choice in Recent State Highway Tests and a Prime Favorite with Road Builders Everywhere.***

NEVER before has any tractor in the road building field been accorded such hearty and universal commendation as Cletrac "K." During the past year this work-eating power unit has been given rigorous tests on the hardest jobs. It has been exhaustively tried under the most difficult conditions. It has been put to comparative tests for economy, power, stamina and endurance. And in every single instance Cletrac "K" made a showing that was truly a revelation.

## Three State Highway Departments Have Recently Added Batteries of Model "K" Cletracs to Their Equipment

The recent purchases of large numbers of Cletracs by State Highway Departments is a tribute to the supremacy of Cletrac for road work. Tennessee has so far this year bought tweny-one Model K's, making a total of fifty-seven Cletracs now operated by this state. South Carolina has recently added nineteen Model K's to their equipment. On March 8th West Virginia bought an additional six K's, making their total eighteen Cletracs. State Highway Departments and Road Contractors alike have come to look upon Cletrac "K" as the one logical and sensible tractor for highway work. Its tremendous power, its sure traction in any soil and on any grade, and above all, its unmatched economy, make it the most eminently suitable power unit in the road building and road maintenance field.

## *Mail the Coupon Today*

There are facts about this sturdy tractor that you should know. A letter—or the coupon mailed to us today will place the whole Cletrac story before you.

## The Cleveland Tractor Co.

**Cleveland, Ohio**

THE CLEVELAND TRACTOR CO.,
Cleveland, Ohio

Please send at once your booklet "Cletrac K for all Road Work."

Name_____

Address_____

_____

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## SHOTS FROM THE FIRING LINE — Cont.

The Nelson Construction Co. are low bidders for a link of highway work in Jersey County, Illinois. Their bid was $25,191.50.

Lou Viall wants a job suitable for a small shovel and dinkey outfit. 3936 Euclid Avenue, Kansas City, Missouri, will catch him.

Competition was close and keen on the 152 miles of construction contracts in the Missouri state highway system, for which bids were received and opened at Jefferson City on May 7th by Engineer B. H. Peipmeier. There were 375 bids covering forty-six projects in twenty counties. Mileage covered called for these classes of construction: Concrete paving 104 miles, graveled surface construction 16 miles, and graded earth 32 miles. The contracts also covered two large bridges, one over the Gasconade River on Route No. 7, between Vienna and Rolla, and the other in Lincoln County.

Arthur Stansell died at his home in Columbus, Mississippi, on May 1st. Death came to him while he was asleep. Members of the family, going to awaken him for breakfast, found him dead. Stansell just recently returned from Florida, where he went in the hope of regaining his health but in vain, and on his return had to stop at a Birmingham hospital on account of a slight heart attack.

Sanderson & Porter completed the new $150,000 dam for the Hot Springs Water Company on April 9th. The dam is 163 feet long, 53 feet high and 35 feet thick at bottom. This will impound a lake over a mile long, which will have a capacity of two hundred million gallons of water. Over 42 acres were cleared of timber for the basin of the new lake.

The Helena, Arkansas, Improvement Commission, organized and authorized to erect river terminals there, announced on May 3rd that final plans had been approved by the War Department and construction bids would be asked for immediately.

E. D. Tyner Construction Co., Kansas City, were awarded contract for 4.3 miles of concrete paving in Jackson County, Missouri.

H. G. (Shorty) Wells of Wogan & Wells, Denver, Colorado, was here bidding on the Muscle Shoals, Birmingham & Pensacola Railroad work. A little high. He returned West, promising to be back soon.

W. C. Meneely Co., Decatur, Illinois, were awarded contracts on Route 39, Sections 2, 3 and 4, McLean County, Illinois. Their bid was $269,687.

Cameron, Joyce, Smith & Elder, Keokuk, Iowa, were awarded contracts for 5.3 miles of concrete paving in Ralls County, Missouri, and 14.67 miles of concrete paving in Pike County, Missouri.

W. A. Ross Construction Co., Kansas City, Missouri, was awarded contract for 0.492 miles of concrete paving in Lincoln County, Missouri.

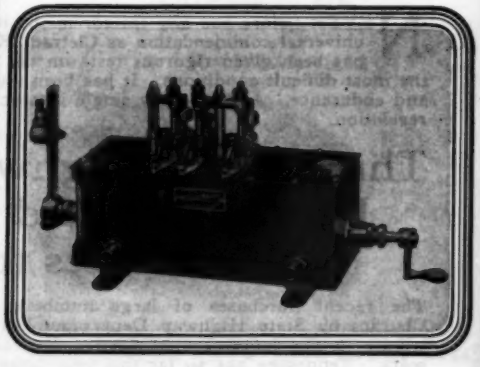
Extension of the yard facilities of the Illinois Central at Paducah by construction of connecting tracks with the new Edgewood Fulton Cut-off line at a cost of approximately $600,000 was announced by Illinois Central Railroad Officials. Thirteen miles of new track will be built.


# A McCord Force Feed Lubricator Will Keep Your Shovel on the Job

A McCord force feed lubricator installed on your steam shovel now will insure more continuous operation. Dependable force feed lubrication prevents shutdowns and delays, it gives more hours on the job.

McCord force feed lubricators are used as standard equipment by the largest and best-known steam shovel builders and they will be installed on any shovel at your request.

Put a McCord lubricator on now and be assured of dependable lubrication for the life of your shovel.



McCord Class B. A. Force Feed Lubricator

**McCord Radiator & Mfg. Co.**
Detroit, Michigan

**McCord**
*force feed*
**Lubricators**

TODAY it's Diesel power! For stationary pumping plants—for driving dredging and excavating machinery—the F-M Diesel has proved the ideal power.

# Facilities—
## that mean more Diesel per dollar

Plant equipment is vital to the successful building of a Diesel engine. And the manufacturing facilities of Fairbanks-Morse are without equal.

Typical of the painstaking thoroughness that governs the manufacture of each part of the F-M Diesel from source of raw materials to finished product, is the making of the crankshaft — that all-essential part of an engine.

From test of the steel bloom — through forging, heat-treating, re-testing, machining and balancing — every step is carried out under the roof of the big F-M Diesel engine plant at Beloit, Wis. The illustration above, painted from the actual operation, shows the spectacular operation that takes place when a thousand-ton forging press forms the crankshaft.

FAIRBANKS, MORSE & CO., Chicago

28 branches throughout the United States at your service

# FAIRBANKS-MORSE

## Diesel Engines - Pumps - Motors

*Complete power and pumping equipment for dragline, dredging and drainage service*

AOA31.3—1837

For convenience in making inquiry use postal inserted in this number.

## SHOTS FROM THE FIRING LINE — Cont.

Major C. C. Gee, United States Engineer at Kansas City, will shortly let contracts for revetment work along the Missouri River.

Hurtgen & Sayer were awarded bridge contract in Lincoln County, Missouri. Their bid was $37,802.51.

Edward J. Eiff of Quincy, Illinois, is low bidder for a stretch of road work in Pike County, Illinois.

V. E. Koch, Joplin, Missouri, was awarded contract for 2.4 miles of concrete paving in Jasper County, Mo.

Cook & O'Brien Construction Co., Kansas City, were awarded contract for 4.5 miles of concrete paving in Pettis County, Missouri.

The C. H. Atkinson Paving Co. of Watertown, South Dakota, were awarded 13.7 miles of concrete paving in Boone County and 13.6 miles of concrete paving in Randolph County, Missouri.

W. F. Sherbing, Honey Creek, Wisconsin, reports a machine outfit idle that he would like to place on work immediately.

Harry A. Carpenter, Brazil, Indiana, was awarded paving contract, Route 31, Section 17, Fulton County, Illinois. His bid was $114,825.82.

John Kenney put one of his small shovels to work at stripping 50,000 yards for the Columbia Quarry Co., Columbia, Illinois.

J. P. Juett is back from Florida. He is going West.

John L. Simons, La Plata, Missouri, has some bridge, fresno and culvert work to sublet.

J. R. Swigart, Room 515, 343 Dearborn Street, Chicago, has a Bucyrus 50-B shovel, 35-yard cars and two 20-ton locomotives idle at Farina, Illinois. He wants work for them and can move immediately.

Contractors when in want of work or labor for their outfits write, wire or phone Koenig Labor Agency, 612 Walnut Street, St. Louis, Missouri, or 501 Delaware Street, Kansas City, Missouri.

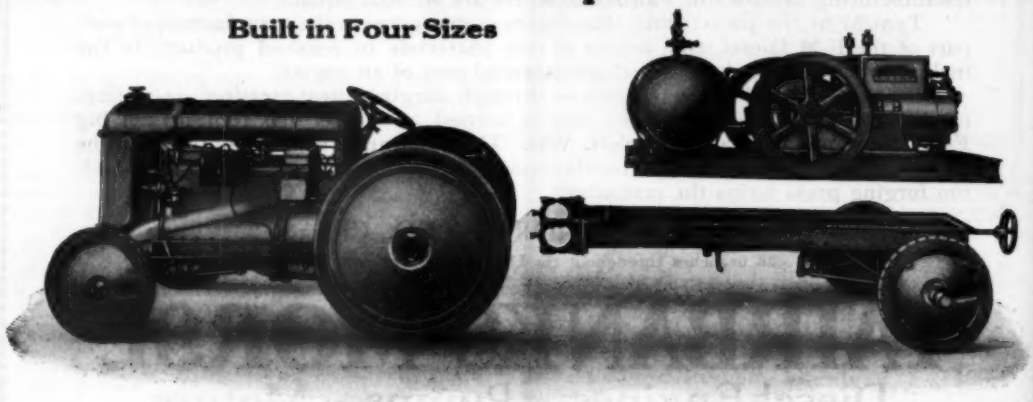
Harrington Bros. have an 18-team outfit idle in St. Louis County and want work for it. A letter addressed to 3500 St. Louis Avenue, St. Louis, Missouri, will reach them.

G. G. Waugh of Waugh Bros., Inc., Fayetteville, Virginia, report a couple of shovel and car outfits idle at Simpson, Illinois, that they can place on work immediately. Write them to Simpson, Illinois, where they are doing some Illinois Central Railroad work.

The Industrial Track Construction Co. were awarded the following contracts by the Wabash Railroad Co.: Constructing 8½ miles single track between Griggsville and Ballis, Illinois; 6 miles between Rennick and Moberly, Missouri; 10 miles single track, rock ballasting between Aetna and Crocker, Indiana; 13 miles between Carrollton and Kansas City, Missouri, 23 miles ballasting between Moberly and Salisbury, Missouri; 10 miles double track between Poag and Worden, Illinois; 28 miles double track ballasting between Sibley and Mansfield, Illinois; also 3 miles double track reballasting between Litchfield and Honey Bend, Illinois.


# The "SCHRAMM" Self-Propelled COMPRESSOR

**Built in Four Sizes**



Showing Compressor and Trailer and How Easy It Is to Couple Same to Tractor.

*Write for 1926 Catalog and Details of Free Demonstration*

**SCHRAMM, Inc.**

**Main Office and Factory: West Chester, Pa.**

54 Dey Street, New York
549 W. Washington Street, Chicago
331 Fourth Avenue, Pittsburgh
709 Arch Street, Philadelphia

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# Turning Night Time Into Work Time with a Kohler Electric Plant

As a means of making more money for all who operate power shovels, ditchers, dredges, draglines, pavers and other excavating and construction equipment, the Kohler Automatic Electric Plant stands well up toward the head of the list.

After darkness this compact, powerful electric plant, mounted on the platform of the equipment, generates enough electric current to flood light the entire zone of operation. Thus it enables contractors to keep their equipment in operation 16, 20 or 24 hours per day instead of 8, 10 or 12.

Doubling the working hours means doubling the output per machine, and reducing the "overhead" per job.

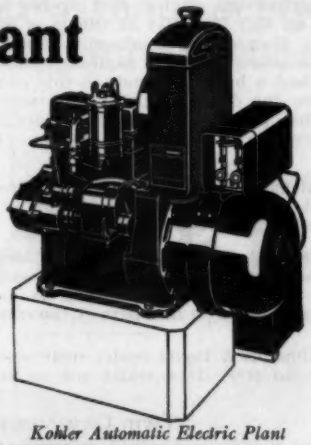
It means meeting completion dates on time.

It means more jobs per season — and better service to clients.

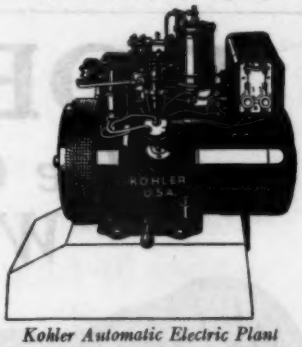
By increasing the margin between income and expense, the Kohler Plant pays its cost out of increased profits.

Kohler Automatic Electric Plants have been used by contractors for years. They can be supplied by the manufacturers of your equipment, by our dealers, or direct from the factory or branch offices.

Ask for complete information and a demonstration.



*Kohler Automatic Electric Plant*
*Model "D"— 1500 Watts — 110 Volts*
4 cylinder, valve-in-head, water-cooled engine.
4 pole, compound wound, over-size generator.
Measurements — exclusive of starting battery — length 35 inches; width 16¼ inches; height 34¾ inches.
Built also in 2000-watt capacity.




*Kohler Automatic Electric Plant*
*Model "S"— 800 Watts — 110 Volts*
2 cylinder, valve-in-head, air-cooled engine.
4 pole, compound wound, over-size generator.
Measurements — exclusive of starting battery — length 27⅝ inches; width 17⅛ inches; height 26⅛ inches.

## KOHLER OF KOHLER

KOHLER CO., *Founded 1873*, KOHLER, Wis.
*Shipping Point*, Sheboygan, Wis.
***Branches in Principal Cities.***

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## SHOTS FROM THE FIRING LINE — Cont.

Andrew O. Cunningham, mayor of University City (a suburb of St. Louis), consulting engineer of the St. Louis Terminal Railroad Association, inventor, and well known in engineering circles, died at his home in University City on May 9th after an illness of one week induced by heart disease and pneumonia. Cunningham for a number or years was chief engineer of the Wabash Railroad, and had a host of friends in this country who sincerely mourn the death of this grand man. The flag at the city hall and all other public buildings in University City will remain at half mast in respect of the memory of him.

Richard Costello of Costello Bros. was with us a couple of days. They have outfits at work in Kentucky, Alabama and Florida.

Chas. T. Jordan of Rumsey & Jordan, Seattle, Washington, passed through St. Louis with his wife on their way back to Seattle. Jordan is motoring back slow, sizing up work in this part of the country.

Allhands & Davis sublet their work on the Santa Fe Railroad at Fairfax, Oklahoma, to Sanders Bros.

### Twin City News

BY J. CARL YETTER

T. J. Friederick, Minneapolis, was awarded two grading contracts by the Wisconsin Highway Commission on April 28th.

S. J. Groves & Sons, Minneapolis, were the successful bidders on some grading work in Wisconsin recently.

Barnand & Curtis, Minneapolis, were awarded another drainage contract near Van Wert, Ohio.

M. J. Nolan Construction Company, Minneapolis, have started laying concrete and report everything going in fine shape.

Morris & Dougherty, St. Paul, have recently been awarded several grading projects by the Soo Line Railroad.

John Hirschburger, Hanlin, Montana, was low bidder on some highway work at Medora, North Dakota.

J. J. & M. S. Mergens, Minneapolis, were the successful bidders on 340,000 yards of excavation let by The Minnesota State Highway Commission on April 20th.

Moore & Pettyjohn, St. Paul, have placed two of their shovels on J. J. & M. S. Mergen's work.

### Canada

*Montreal and Vicinity*

BY J. M. WARD

McGinnis & O'Connor of Kingston, Ontario, have been awarded 12 miles of grading for the Ontario highways as well as a couple of bridges.

The late spring has kept back a lot of work which should have been well under way by this time, but matters have greatly improved within the last week and we are looking for a busy season.

The Grenville Crushed Rock Company expect to reopen their quarry at Deeks, Ontario, to furnish ballast for the Canadian Pacific Railroad double track.


# ROEBLING

## *Blue Center Steel Wire Rope*

is especially adaptable to heavy duty, where heavily applied loads and sudden stresses tax the rope to utmost strength.

### *For Dredging*

this rope excels all others for durability, uniformity and toughness.

**John A. Roebling's Sons Co.**
TRENTON, NEW JERSEY

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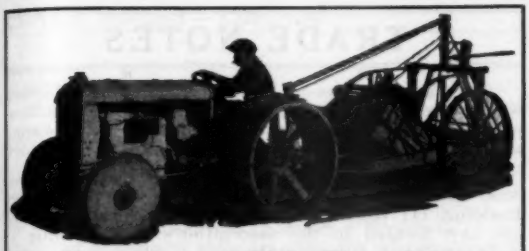


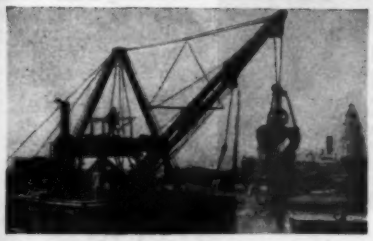
## The Miami Scraper Picks Up and Carries a Full Load Where You Want It

Ninety per cent of your cost of moving loose earth by tractor consists of drivers wages, gasoline, oil and general upkeep, or $10.00 to $12.00 per day.
You must move a given number of cubic yards to repay you this expense.
Your profit comes only from the EXCESS cubic yards above this given number.
The Miami One-Man Power Scraper delivers twice the yardage of the drag type scraper, because the scoop pan is elevated in front and carries the load on Roller Bearing wheels in high-speed, if you wish.
Your operator delivers a full load where you want it.
This excess yardage means $10.00 to $15.00 per day operating profit. Are You getting it?
One man operates both tractor and scraper. Write today for complete information.

**The Miami Trailer-Scraper Co.**
**603 South Clay Street Troy, Ohio**

**MIAMI -one man- power SCRAPER**
REG. U. S. PAT. OFF.

# Hayward Buckets



THERE is no sentiment in contractors' choice of a bucket to handle the rough, tough digging and material rehandling jobs—they select a bucket for what it will do.

That is why Hayward Buckets are found on important projects of every character—they get results as measured by the requirements of the job.

THE HAYWARD COMPANY
52-54 Church Street, New York, N. Y.

*Builders of Clam Shell, Orange Peel, Drag Line, and Electric Motor Buckets; Dredging, Excavating, Coal Handling Machinery; Automatic Take-Up Reels; Counterweight Drums.*

—MADE— 3345-Y

# MOVE to the next job without delay —without injury to your machines—

Use a Rubber-Tired

# TRAILER

(Built to carry Steam Shovels)

Just Out—Two new 8-Wheel Trailers—25 tons and 40 tons—with smaller wheels and longer platforms for end loading.

*Ask for particulars.*

**BUCYRUS COMPANY**
SPECIALTY DEPARTMENT
SOUTH MILWAUKEE, WIS., U. S. A.

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## SHOTS FROM THE FIRING LINE — Cont.

Mr. Wm. Cook and Mr. V. J. Cavicchi of Cavicchi & Cook have been in Montreal for a few days. They have opened an office in the New Birks Building. The many friends of Mr. V. J. Cavicchi will sympathize with him in the loss of his eldest daughter who died the end of April from pneumonia.

The Aluminum Company of Canada have taken over control of the Duke-Price Power Company in the Lake St. John District. The Shawinigan Paper & Power Co. have also taken an interest in this, and they are starting immediately on their transmission line from Isle Maligne, Province of Quebec, to Quebec City. This will be one of the longest high voltage lines in the country.

We had a visit from Mr. Andrew Wheaton of the Dominion Construction Co.

The Grenville Crushed Rock Company have secured contract to build 8 miles of railway for the International Paper Co. at Chelsea, Province of Quebec.

*Toronto and Vicinity*

BY C. F. ENGLAND

There is quite a lot of sewer construction going on in Toronto and vicinity. This will probably continue for some time with the North Toronto sewer scheme, together also with the sewer work in adjoining districts.

Owing to the very late spring, construction work has been somewhat retarded. This applies particularly to road work where the ground has to be fairly well dried out before construction can be started.

## TRADE NOTES

*The Tulley Equipment Company, St. Louis, Missouri*, who are representatives of the Climax Engineering Company, Clinton, Iowa, have moved to their new location at 2339 Pine Street.

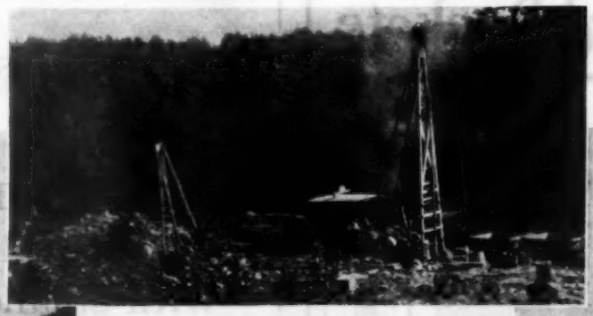
The general offices of the *Portland Cement Association*, which for the past 10 years have been in the Conway Building, 111 West Washington Street, Chicago, Illinois, are now located in the association's new building at *33 West Grand Avenue, Chicago.*

*The Duff Manufacturing Company, Pittsburgh, Pennsylvania*, manufacturers of the Duff High Speed and Duff Governor controlled jacks, as well as the Genuine Barrett Track Jacks, have announced the appointment of Mr. Albert Roberts as district manager of the Southern territory with offices in the Candler Building, Atlanta, Ga.

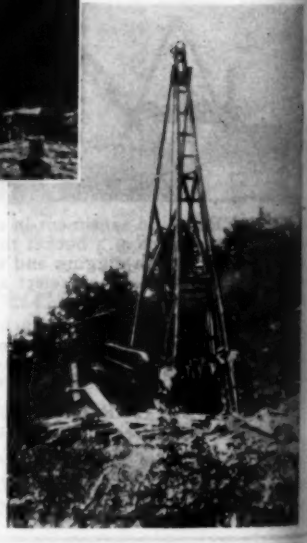
February 22, 23, 24 and 25, 1927, are the dates announced for the Second Annual Southwest Road Show and School to be held at Wichita, Kansas. This show will be held under the auspices of the Wichita Thresher and Tractor Club, Incorporated. Their first show and school was held the first week of last March and proved very successful.

The oil-electric locomotive, the latest development in American railroading, is to make its appearance within the next six weeks in the mining field. Announcement was made by the *Ingersoll-Rand Company*, joint producer with the American Locomotive and General Electric companies, of the oil-electric, that one of the 60-ton type has


CYCLONE DRILLS



—on the S. I. and K. R. R. job.



THERE was a great deal of heavy rock work on the Southern Illinois and Kentucky Railroad job. Twenty-three blast hole drills of the well driller type were used by the several contractors. Twenty-one of these twenty-three were Cyclone Drills. The machines shown belong to A. Guthrie & Co., Inc.

Our book *"Big Blast Hole Drills"* (120 pages) is of interest to anyone interested in heavy rock excavation. Ask for a copy.

**The Sanderson-Cyclone Drill Co.**
**Orrville, Ohio**
**Eastern and Export Office: 30 Church St., New York**

## TRADE NOTES — Continued

been ordered by the Utah Copper Company, for use at its mines at Bingham, Utah.

The debut of the oil-electric locomotive at the Utah copper mines will mark its first invasion in mining operations anywhere in the world.

In announcing the placing of the order by the Utah Copper Company, officials of the Ingersoll-Rand Company stated that the locomotive is to be installed purely in the interest of economy of operation. Engineers of the producing companies estimate that the oil-electric will save four cents on every ton of material it hauls from the mines. This includes ore and waste rock as it is taken out.

The Utah Copper Company owns an entire mountain at Bingham, and its 57 steam locomotives haul from it over 30,000,000 tons of material each year. Based upon an average of 526,315 tons hauled by each locomotive during the year, the saving effected by the oil-electric, at four cents a ton, would run to $21,052.60 on its year's work.

Oil-electric locomotives are in use on four railroad systems in the East, while other systems in the East and West have placed orders for them. The Chicago and North Western Railroad has just installed one.

## REVIEW OF BOOKS and CATALOGS

We shall be glad to review, in this column, such books and catalogs as are sent to us.

PIT AND QUARRY HAND BOOK — 1926 edition, 5½ x 8¾ inches, 576 pages and cover. This handbook is divided into thirty sections, each of which was prepared by a specialist. Some of the most important of these sections are: clinker handling, drilling and blasting, accident prevention, crushing, grinding and pulverizing, elevating and conveying, storing and miscellaneous handling, etc. The book is published primarily for use within the non-metallic mineral industries, which consist principally of cement, lime, gypsum, crushed stone, sand and gravel. Copies can be purchased from *Pit and Quarry, Rand-McNally Building, Chicago, Illinois.*

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The Highway Research Board has issued Part 2 of its Proceedings of the Fifth Annual Meeting held at Washington, District of Columbia, last December. This Part 2 contains the report of investigation of the economic value of reinforcement in concrete roads by C. A. Hogentogler. The book, 6¾ x 9¾, 136 pages and covers, contains a very complete report of this special investigation, and gives illustrations and actual photographs with other data on the fracture of concrete roads of different construction and under different conditions. Discussions by members of a number of State Highway Commissions and by members of the United States Bureau of Public Roads are included. Copies may be obtained by addressing the *Highway Research Board, Department of National Research Council, Washington, District of Columbia.*

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A BIBLIOGRAPHY ON RESEARCH — 6 x 9 inches, 46 pages and cover. It is said that the Bibliography is the most complete survey of current articles on research yet published. The subject is of general interest to all industries, and the form accessible for ready reference. Copies may be had upon writing the *National Research Council, Division of Engineering and Industrial Research, B and 21st Streets, Washington, District of Columbia.*

*Take the advice of an old-timer*

**To avoid trouble—use Albany Grease**

Being a thorough lubricant, Albany Grease keeps the bearings cool, prevents overheating and scoring even when sudden and unusually heavy loads are put on the bearings. Never drips. Sold in cans and barrels—all consistencies.

*Demand Albany Grease, refuse substitutes—look for the trade mark. If your dealer cannot supply you, write us.*

**ALBANY GREASE**

ADAM COOK'S SONS, Inc. 6 Varick Street, New York

**TWIN CITY ENGINES**

*This SARGENT DITCHER is powered by a TWIN CITY ENGINE.*

OTHER Twin City users include: Austin Machinery Corp., Baldwin Locomotive Works, Bucyrus Co., The Parsons Co., Northwest Engineering Co., Inland Engineering Co., Pennsylvania Pump & Compressor Co., Star Drilling Machine Co., Washington Iron Works, Willamette Iron & Steel Works, etc. Specify Twin City Engines on *your* equipment. Sizes 35 to 140 H. P. Write for literature.

**Minneapolis Steel & Machinery Co.**

MINNEAPOLIS, MINN.

Heavy Duty Engine Manufacturers Since 1903

**"BUILT TO DO THE WORK"**

## BOOK REVIEWS — Continued

**PROCEEDINGS OF THE LAKE SUPERIOR MINING INSTITUTE** — 6 x 9 inches, 374 pages and cover. Contains a report of the twenty-fourth annual meeting held at Ishpeming and Sault Ste. Marie, August 13th and 14th, 1925, as well as several interesting articles on iron mining industries, etc., published by the *Lake Superior Mining Institute at Ishpeming, Michigan.*

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**EXPERIMENTAL IMPACT STUDIES ON HIGHWAY BRIDGES** — Bulletin 75, 6 x 9 inches, 64 pages and cover. Published by the Iowa State College of Agriculture and Mechanic Arts. This bulletin reports the results of a co-operative research investigation conducted by the Iowa Engineering Experimental Station, the United States Bureau of Public Roads, and the Iowa State Highway Commission. Copies may be obtained upon writing the *United States Department of Agriculture, Bureau of Public Roads, Washington, District of Columbia.*

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**"DIRECT-INJECTION OIL ENGINES FOR ALL PURPOSES,"** is the title of a new publication just issued by the *Ingersoll-Rand Company, New York.* The cover, which is printed in colors, illustrates the major title by portraying the Ingersoll-Rand oil engines as applied to railway, marine, power-house, industrial and building applications. The text matter, which consists of technical data and details of their "PO" oil engines of 55, 110 and 150 B. H. P. sizes, is profusely illustrated by 42 illustrations of plant layouts, installation views, diagrams and engine details. A copy of this publication is available to executives and engineers on request by addressing the *Ingersoll-Rand Company, 11 Broadway, New York,* or any of their representatives in the principal cities of the United States and all foreign countries.

**New Type "CLIPPER" Blast Hole Drill in Crawler or Round Wheel**

The First Crawler Blast Hole Drill ever produced! Has proven an unqualified success.

When equipped with 40 H. P. gasoline engine for soft and excessively bad moving it gives a unit that shoves right through.

The "CLIPPER" is known among users as THE DRILL THAT DRILLS. One of the reasons it predominates.

**The Loomis Machine Company**
*(Established 1847)*
K Street, Tiffin, Ohio

# WANTED

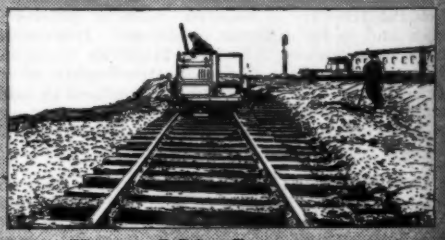
**$5,000,000 in used equipment for 1926, for our 35,000 listed members.**
Give full description, location, condition, price, terms, etc. Ask for full details of our services.

**National Equipment Co.**
400 West First Street
BLOOMINGTON, INDIANA

THE NORDBERG PATENTED
# TRACK SHIFTER

*It will shift and raise track on waste Dumps-open Pit Mines Quarries-Construction Work Behind Steam Shovels*

Here is a machine that will eliminate the use of track jacks and bars, cut track crew to less than half, and do four times the work.
*Write for Bulletin GR-8.*



**Nordberg Mfg. Co.** MILWAUKEE WIS. U.S.A.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# POINTS OF MARKED SUPERIORITY IN HERCULES DETONATORS

Hercules Electric Blasting Caps are shorter and larger in diameter than most others. This permits of better construction of the electrical elements. It also enables us to produce better water-resisting qualities in our electric caps than are found in electric caps of other manufacture. he shorter cap is less likely to go through the cartridge and detonate from im- ct with the sides of the bore hole.

idge wires are made of platinum-iridium, and broken bridges in our electric ps are practically unknown. Positive contact between the two wires is secured a spring clip on the ends of the wires if this feature is specified on your order.

th Hercules Blasting Caps and Hercules Electric Blasting Caps are charged th a fulminate-chlorate mixture. This is more expensive than the compounds ed by some others, and it is more effective, more certain, and will stand up bet- than the cheaper compositions under the varied conditions met in the field.

## *HERCULES POWDER COMPANY*

*(INCORPORATED)*

*Dynamite—Permissible Explosives—Blasting Powder—Blasting Supplies*

*Sales Offices:*

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RCULES POWDER COMPANY,
949 King Street,
Wilmington, Delaware

Please send me your new booklet describing the advantages of Hercules Electric Blasting Caps.
Please have your nearest branch office quote on the following explosives and blasting supplies:

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Bird's-eye View of Steam Shovel Pit of United Verde Mine from Cleopatra Mountain — Note the Well Drills on the Benches to the Left

One of the Two 1¼-yard Electric Shovels Loading Motor Trucks Equipped with Side Dump Bodies